

**IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS  
WACO DIVISION**

GLOBALFOUNDRIES U.S. INC.,

Plaintiff,

v.

TAIWAN SEMICONDUCTOR  
MANUFACTURING CO., LTD.;  
TSMC NORTH AMERICA;  
TSMC TECHNOLOGY, INC;  
NVIDIA CORPORATION; and  
LENOVO GROUP LTD.

Defendants.

C.A. No.: 6:19-cv-496

JURY TRIAL DEMANDED

**COMPLAINT FOR PATENT INFRINGEMENT**

Globalfoundries U.S. Inc. (“Globalfoundries” or “Plaintiff”), brings this action for patent infringement under 35 U.S.C. § 271 against Taiwan Semiconductor Manufacturing Co., Ltd., TSMC North America, and TSMC Technology, Inc. (collectively, “TSMC”), NVIDIA Corporation (“NVIDIA”), and Lenovo Group Ltd. (“Lenovo”) (collectively, “Defendants”) and alleges as follows:

**THE PARTIES**

1. Plaintiff Globalfoundries U.S. Inc. is a Delaware corporation with its principal place of business at 2600 Great America Way, Santa Clara, California 95054.

2. Taiwan Semiconductor Manufacturing Co., Ltd. is a Taiwanese company, and is located at No. 8, Li Hsin Road VI, Hsinchu Science Park, Hsinchu 300-78, Taiwan, R.O.C. Taiwan Semiconductor Manufacturing Co., Ltd. is the parent corporation of Defendants TSMC Technology, Inc. and TSMC Technology, Inc.

3. Taiwan Semiconductor Manufacturing Co., Ltd., either itself and/or through the activities of its subsidiaries, makes, uses, sells, offers for sale, and/or imports throughout the United States, including within this District, products, such as semiconductor devices and integrated circuits, that infringe the Asserted Patents, defined below. Taiwan Semiconductor Manufacturing Co., Ltd.'s customers incorporate these products into downstream products that are made, used, sold, offered for sale, and/or imported throughout the United States, including within this District. These downstream products may include, but are not limited to, integrated circuits, smartphones, tablets, televisions, smartwatches, and various other products that include semiconductor devices and integrated circuits.

4. TSMC North America is a wholly-owned subsidiary of Defendant Taiwan Semiconductor Manufacturing Co., Ltd. TSMC North America is a California corporation with its principal place of business at 2851 Junction Avenue, San Jose, California 95134. TSMC North America provides sales, research, and development support in North America for its ultimate parent, Taiwan Semiconductor Manufacturing Co., Ltd. TSMC North America makes, uses, sells, offers for sale, and/or imports throughout the United States, including within this District, products, such as semiconductor devices and integrated circuits, that infringe the Asserted Patents. TSMC North America's customers incorporate these products into downstream products that are made, used, sold, offered for sale, and/or imported throughout the United States, including within this District. These downstream products may include, but are not limited to, smartphones, tablets, televisions, smartwatches, and various other products that include semiconductor devices and integrated circuits.

5. TSMC Technology, Inc. is a wholly-owned subsidiary of Defendant Taiwan Semiconductor Manufacturing Co., Ltd. TSMC Technology, Inc. is a Delaware corporation, and

has a principal place of business at 2851 Junction Avenue, San Jose, California 95134. TSMC Technology, Inc. provides sales, research, and development support in North America for its ultimate parent, Taiwan Semiconductor Manufacturing Co., Ltd. TSMC Technology, Inc. makes, uses, sells, offers for sale, and/or imports throughout the United States, including within this District, products, such as semiconductor devices and integrated circuits, that infringe the Asserted Patents. TSMC Technology, Inc.'s customers incorporate these products into downstream products that are made, used, sold, offered for sale, and/or imported throughout the United States, including within this District. These downstream products may include, but are not limited to, smartphones, tablets, televisions, smartwatches, and various other products that include semiconductor devices and integrated circuits.

6. NVIDIA Corporation is a Delaware corporation with its principal place of business at 2788 San Tomas Expressway, Santa Clara, California 95051.

7. NVIDIA, either itself and/or through the activities of its subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), makes, has made, uses, sells, offers for sale, imports, and/or has imported throughout the United States, including within this District, products, such as semiconductor devices and integrated circuits, that infringe the Asserted Patents, defined below. NVIDIA either itself and/or through the activities of its subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), incorporates these products into downstream products that are made, used, sold, offered for sale, and/or imported throughout the United States, including within this District. These downstream products may include, but are not limited to, integrated circuits, smartphones, tablets, televisions, smartwatches, and various other products that include semiconductor devices and integrated circuits.

8. Lenovo Group Ltd. is a Chinese corporation with its principal place of business is at 6 Chuang ye Road, Haidian District, Beijing 100085, China.

9. Lenovo Group Ltd., either itself and/or through the activities of its subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), makes, has made, uses, sells, offers for sale, imports, and/or has imported throughout the United States, including within this District, products containing semiconductor devices, that infringe the Asserted Patents, defined below.

### **THE ASSERTED PATENTS**

10. United States Patent No. 8,823,178, entitled “Bit Cell With Double Patterned Metal Layer Structures,” issued on September 2, 2014, to inventors Juhan Kim and Mahbub Rashed. The ’178 patent expires on December 16, 2032. The ’178 patent issued from U.S. Patent App. Ser. No. 13/617,853, filed on September 14, 2012, and was previously published as U.S. Patent Pub. No. 2014/0077380 on March 20, 2014.

11. United States Patent No. 9,105,643, entitled “Bit Cell with Double Patterned Metal Layer Structures,” issued on August 11, 2015, to inventors Juhan Kim and Mahbub Rashed. The ’643 patent expires on July 22, 2034. The ’643 patent issued from U.S. Patent App. Ser. No. 14/337,596, filed on July 22, 2014, and was previously published as U.S. Patent Pub. No. 2014/0332967 on November 13, 2014.

12. United States Patent No. 7,378,357, entitled “Multiple Dielectric FinFet Structure and Method,” issued on May 27, 2008 to inventors William Clark, Jr. and Edward Nowak. The ’357 patent expires on May 8, 2025. The ’357 patent issued from U.S. Patent App. Ser. No. 11/264,446, filed on November 1, 2005, and was previously published as U.S. Patent Pub. No. 2006/0054978 on March 16, 2006. The ’357 patent claims priority to U.S. Patent App. No. 10/708,674, filed on March 18, 2004, now U.S. patent No. 7,115,947.

13. United States Patent No. 9,082,877, entitled “Complementary metal oxide semiconductor (CMOS) device having gate structures connected by a metal gate conductor,” issued on July 14, 2015 to inventors Yue Liang, Dureseti Chidambarao, Brian J. Greene, William K. Henson, Unoh Kwon, Shreesh Narasimha, and Xiaojun Yu. The ’877 patent expires on January 3, 2032. The ’877 patent issued from U.S. Patent App. Ser. No. 14/292,312, filed on May 30, 2013, and was previously published as U.S. Patent Pub. No. 2014/0349451 on November 27, 2014. The ’877 patent claims priority to, and is a divisional of, U.S. Patent App. No. 13/342,435, filed on January 3, 2012, now U.S. patent No. 8,803,243.

14. By way of assignment, Plaintiff owns all rights, title, and interest to the ’178 Patent, the ’643 Patent, the ’357 Patent, and the ’877 Patent (collectively, the “Asserted Patents”).

15. The Asserted Patents are each valid and enforceable.

#### **JURISDICTION AND VENUE**

16. This action arises under the Patent Act, 35 U.S.C. § 1 *et seq.*

17. Subject matter jurisdiction is proper in this Court under 28 U.S.C. §§ 1331 and 1338(a).

18. Venue in this District is proper under 28 U.S.C. § 1391(c)(3) and 28 U.S.C. § 1400(b) with respect to TSMC. Defendant Taiwan Semiconductor Manufacturing Co., Ltd. is not a resident of the United States and may be sued in any district, including this District. All Defendants have committed acts of infringement in this District.

19. With respect to Defendant Taiwan Semiconductor Manufacturing Co., Ltd., a Taiwanese company, venue is proper because suits against foreign entities are proper in any judicial district where they are subject to personal jurisdiction.

20. With respect to Defendant TSMC North America, venue is proper in this district under 28 U.S.C. § 1400(b) because Defendant TSMC North America has a regular and established

place of business in this district and has committed acts of infringement in this district. Defendant TSMC North America has a permanent office location at 11921 N. Mopac Expressway, Austin, Texas 78759, which is located in Travis County and within this district. Defendant TSMC North America also employs full-time personnel such as sales personnel and engineers in this district, including in Austin, Texas. Defendant TSMC North America has also committed acts of infringement in this district by commercializing, marketing, selling, distributing, testing, and servicing certain Accused Products.

21. With respect to Defendant TSMC Technology, Inc., venue is proper in this district under 28 U.S.C. § 1400(b) because Defendant TSMC Technology, Inc. has a regular and established place of business in this district and has committed acts of infringement in this district. Defendant TSMC Technology, Inc. has a permanent office location at 11921 N. Mopac Expressway, Austin, Texas 78759, which is located in Travis County and within this district. Defendant TSMC Technology, Inc. also employs full-time personnel such as engineers in this district, including in Austin, Texas. Defendant TSMC Technology, Inc. has also committed acts of infringement in this district by commercializing, distributing, testing and servicing certain TSMC-branded devices, including but not limited to integrated circuits using TSMC 28 nanometer and smaller technology and products containing these integrated circuits, which are devices Globalfoundries accuses of infringement in this action.

22. This Court has personal jurisdiction over the TSMC Defendants. The TSMC Defendants have conducted and do conduct business within the State of Texas. The TSMC Defendants, directly or through subsidiaries or intermediaries (including distributors, retailers, and others), ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including by providing an interactive web page) their products and/or services in the United States and the

Western District of Texas and/or contribute to and actively induce their customers to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of an interactive web page) infringing products and/or services in the United States and the Western District of Texas. The TSMC Defendants, directly and through subsidiaries or intermediaries (including distributors, retailers, and others), have purposefully and voluntarily placed one or more of their infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in the Western District of Texas. These infringing products and/or services have been and continue to be made, used, sold, offered for sale, purchased, and/or imported by customers and/or consumers in the Western District of Texas. Defendants have committed acts of patent infringement within the Western District of Texas.

23. TSMC has also placed integrated circuits using TSMC's 28 nanometer and smaller technology<sup>1</sup> and products containing these integrated circuits (the "Accused Products") into the stream of commerce by shipping Accused Products into Texas, shipping Accused Products knowing that those products would be shipped into Texas, and/or shipping Accused Products

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<sup>1</sup> TSMC 28 nanometer and smaller technology includes TSMC's 28 nanometer technology (including TSMC's High-k Metal Gate gate-last technology and high-performance compact technology) ("28 Nanometer"), TSMC's 22 nanometer technology (including TSMC's 22 nanometer ultra-low power, 22 nanometer ultra-low leakage, and 22 nanometer ultra-low leakage static random access memory technologies) ("22 Nanometer"), TSMC's 20 nanometer technology ("20 Nanometer"), TSMC's 16/12 nanometer technology (including TSMC's 16 nanometer Fin Field Effect Transistor ("FinFET") process, 16 nanometer FinFET Plus process, 16 nanometer FinFET Compact Technology, and 12 nanometer FinFET Compact Technology) ("16 Nanometer"), TSMC's 10 nanometer technology (including TSMC's 10 nanometer FinFET process) ("10 Nanometer"), TSMC's 7 nanometer technology (including TSMC's 7 nanometer FinFET process) ("7 Nanometer"). Globalfoundries reserves the right to accuse any forthcoming TSMC technology, such as TSMC's 7 nanometer extreme ultraviolet lithography technology and TSMC's 5 nanometer technology.

knowing that these Accused Products would be incorporated into other Accused Products that would be shipped into Texas.

24. For example, through TSMC's multi-project wafer ("MPW") services, TSMC provides customized Accused Products to customers for testing, including customers in Texas. On information and belief, TSMC ships test wafers directly to the customers of its CyberShuttle MPW service and/or has knowledge of the final shipping address for customers of both its CyberShuttle MPW service and the MPW service TSMC offers in connection with Metal Oxide Semiconductor Implementation Service ("MOSIS"). The TSMC Defendants interact with customers in Texas, including through visits to customer sites in Texas. Through these interactions and visits, the TSMC Defendants directly infringe the Asserted Patents. The TSMC Defendants also interact with customers who sell the Accused Products into Texas, knowing that these customers will sell the Accused Products into Texas, either directly or through intermediaries.

25. TSMC Technology, Inc. has an office in Austin, Texas that, on information and belief, engages in engineering, research, and development activities relating to the Accused Products. These activities directly infringe the Asserted Patents. Taiwan Semiconductor Manufacturing Co., Ltd. operates TSMC Technology, Inc.'s website and other online activities, including job postings for its Austin office. TSMC North America similarly has an office in Austin, Texas that engages in sales activities related to the Accused Products, including sales visits to customers in and around Austin. These activities directly infringe the Asserted Patents. Taiwan Semiconductor Manufacturing Co., Ltd. operates TSMC North America's website and other online activities, including job postings for its Austin office. Taiwan Semiconductor Manufacturing Co., Ltd. also operates an annual Technology Symposium in the United States, including workshops in Austin. Both TSMC Technology, Inc. and TSMC North America are regular attendees and/or



exhibitors at these workshops. The TSMC Defendants' activities at these workshops in Austin directly infringe the Asserted Patents. The Court therefore has both general and specific personal jurisdiction over the TSMC Defendants.

26. Venue in this District is also proper under 28 U.S.C. §§ 1391(b), (c), and 28 U.S.C. § 1400(b) with respect to NVIDIA because: (i) Defendant NVIDIA is has a permanent office located in this District, at 11001 Lakeline Blvd., Building 2, Suite 100, Austin, Texas 78717; (ii) Defendant NVIDIA has done and continues to do business in this District; and (iii) Defendant NVIDIA has committed and continues to commit acts of infringement in this District.

27. This Court has personal jurisdiction over NVIDIA. NVIDIA has conducted and does conduct business within the State of Texas. NVIDIA, directly or through subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), ships, distributes, makes, has made, uses, offers for sale, sells, imports, has imported, and/or advertises (including by providing an interactive web page) its products and/or services in the United States and this District, and/or contributes to and actively induces others to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of an interactive web page) infringing products and/or services in the United States and this District.

28. NVIDIA, directly and through subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in this District. These infringing products and/or services have been and continue to be made, used, sold, offered for sale, purchased, and/or imported by customers and/or consumers in this District. NVIDIA has committed acts of patent infringement within this District. Plaintiffs' claims arise

out of and relate to NVIDIA's acts of infringement and/or inducement of infringement in this District, and because the exercise of jurisdiction by this Court over NVIDIA in this action would be reasonable. Accordingly, NVIDIA has minimum contacts with this District such that the maintenance of this action within this District would not offend traditional notions of fair play and substantial justice.

29. Venue in this District is also proper under 28 U.S.C. §§ 1391(b), (c), and 28 U.S.C. § 1400(b) with respect to Lenovo. Lenovo has committed acts of infringement in this District.

30. With respect to Lenovo, a Taiwanese company, venue is proper because suits against foreign entities are proper in any judicial district where they are subject to personal jurisdiction.

31. This Court has personal jurisdiction over Lenovo. Lenovo has conducted and does conduct business within the State of Texas. Lenovo, directly or through subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), ships, distributes, makes, has made, uses, offers for sale, sells, imports, has imported, and/or advertises (including by providing an interactive web page) its products and/or services in the United States and the Western District of Texas, and/or contributes to and actively induces others to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of an interactive web page) infringing products and/or services in the United States and the Western District of Texas.

32. Lenovo, directly and through subsidiaries, affiliates, or intermediaries (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in the Western District of Texas. These infringing products and/or services have been and continue to

be made, used, sold, offered for sale, purchased, and/or imported by customers and/or consumers in the Western District of Texas. Lenovo has committed acts of patent infringement within the Western District of Texas. Plaintiffs' claims arise out of and relate to Lenovo's acts of infringement and/or inducement of infringement in this District, and because the exercise of jurisdiction by this Court over Lenovo in this action would be reasonable. Accordingly, Lenovo has minimum contacts with this District such that the maintenance of this action within this District would not offend traditional notions of fair play and substantial justice.

### **JOINDER**

33. Joinder of Defendants is proper under 35 U.S.C. § 299. The allegations of patent infringement contained herein arise out of the same series of transactions or occurrences relating to the importing into the United States and/or making, using, selling, or offering for sale within the United States, the same Accused Products, including NVIDIA and Lenovo's products fabricated using TSMC's 28 Nanometer or smaller processes.

### **BACKGROUND**

34. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

#### **Globalfoundries**

35. Globalfoundries is a U.S. company with manufacturing facilities that use and develop some of the world's most advanced semiconductor devices available today. Building on IBM's world-class semiconductor technology heritage, Globalfoundries, the acquirer of IBM's semiconductor division, has been accredited as a Category 1A Microelectronics Trusted Source

for fabrication, design, and testing of microelectronics by the U.S. Department of Defense (DOD).<sup>2</sup> Globalfoundries' East Fishkill, New York facility is currently the most advanced Trusted Foundry, and as such is the only facility of its kind that can provide certain advanced circuits to satisfy the DOD's requirements. As the second-largest foundry in the world and the only advanced Trusted Foundry, Globalfoundries is uniquely equipped to efficiently and quickly meet the DOD's advanced and highly classified manufacturing and production needs—and is also equipped to do the same for its private-sector clients.

36. Globalfoundries is the most advanced pure-play foundry in the U.S. and Europe, and employs thousands of people in the U.S. and worldwide. While other companies were abandoning semiconductor manufacturing in the U.S., Globalfoundries bucked this trend by investing billions of dollars on advanced technology and research in the United States. Globalfoundries originated from another leading U.S. semiconductor company, Advanced Micro Devices' semiconductor manufacturing arm in 2009 and expanded globally through acquisition and organic investment. Its largest expenditure by far is its \$15 billion organic U.S. investment in its leading-edge facility known as Fab 8 in Malta, New York. Globalfoundries broke ground for that state of the art facility in 2009 and produces leading edge technology from that location to customers worldwide. A major U.S. acquisition took place in 2015 when Globalfoundries acquired IBM's microelectronics facilities and personnel in Burlington, Vermont and East Fishkill, New York—facilities that became Fab 9 and Fab 10, respectively. Globalfoundries acquired not just IBM's facilities and personnel, but also the fruits of IBM's decades of industry-leading investment in U.S. semiconductor fabrication capacity and technology. Specifically,

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<sup>2</sup> "Aerospace and Defense," <https://www.globalfoundries.com/market-solutions/aerospace-and-defense>.

Globalfoundries obtained 16,000 IBM patents and applications (including the '357 and '877 patents asserted in this action); numerous world-class technologists; decades of experience and expertise in semiconductor development, device expertise, design, and manufacturing; and an expanded manufacturing footprint. The acquisition cemented Globalfoundries' role as a global leader in world-class semiconductor manufacturing and advanced process technologies.<sup>3</sup>

37. Globalfoundries' U.S. manufacturing facilities in Burlington, Vermont; East Fishkill, New York; and Malta, New York use and develop some of the most advanced process nodes and differentiated technologies (inclusive of its 12/14nm FinFET, RF and Silicon Photonics technology solutions) available today. Fab 8 is a leading fabrication facility for advanced manufacturing in the U.S., with 40,875 square meters of cleanroom space and continued expansion, and over 3,000 total employees as of June 2019. The current capital investment for the Fab 8 campus stands at more than \$15 billion, making Fab 8 the largest public-private sector industrial investment in New York State's history. The significance of this investment and its importance to advanced manufacturing in the U.S. have been recognized by top government officials, including by the President of the U.S. during a 2012 visit to New York hosted in part by Globalfoundries.<sup>4</sup>

38. Globalfoundries' investment from the Champlain Valley through the Hudson Valley makes it the spine of the Northeast's Tech Valley. Three out of Globalfoundries' five fabs are in the U.S., but investment does not stop at its manufacturing capacity. Globalfoundries'

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<sup>3</sup> "Globalfoundries Completes Acquisition of IBM Microelectronics Business," <https://www.globalfoundries.com/news-events/press-releases/globalfoundries-completes-acquisition-of-ibm-microelectronics-business>.

<sup>4</sup> "Globalfoundries Welcomes President Barack Obama to NY's Capital Region," <https://blog.globalfoundries.com/globalfoundries-welcomes-president-barack-obama-to-nys-capital-region/>.

manufacturing footprint is supported by facilities for research, development, sales, and design enablement located near hubs of semiconductor activity, including in Santa Clara, California; Dallas, Texas; Austin, Texas; Rochester, Minnesota; Endicott, New York; and Raleigh, North Carolina. Of its 16,000 employees worldwide, approximately 7,200 are employed in the U.S.

### TSMC

39. The TSMC Defendants, however, have taken a different approach and have decided to simply use Globalfoundries' patented inventions without payment or permission. TSMC is a competing semiconductor foundry with manufacturing facilities located primarily in Hsinchu, Taiwan. TSMC has recently expressed an interest in building a new manufacturing facility in the U.S., but has not reported any tangible steps towards implementing its ostensible interest. In contrast, TSMC completed building the most advanced manufacturing facility of its kind in mainland China last year. By bringing advanced 16nm FinFet to China, TSMC has positioned itself to benefit further from the shift in global supply chains out of the U.S. and Europe into Greater China. TSMC develops, manufactures, imports, and sells for importation into the U.S. semiconductor devices, including to the other Defendants. But TSMC does these things on the back of Globalfoundries, using Globalfoundries' patented technologies to make its products. Indeed, although its infringing chips have flooded the U.S. market, it appears that TSMC has attempted to avoid being subject to patent infringement allegations in the U.S. through creative legal and tax structuring. As set forth below, the Accused Products incorporate, without any license from Globalfoundries, many technologies developed by Globalfoundries and protected by patents owned by Globalfoundries. TSMC's, and/or its customers', importation of infringing articles into the U.S. from Greater China and elsewhere abroad directly harms Globalfoundries and its billions in U.S. investments in manufacturing. Globalfoundries respectfully seeks relief from this Court for TSMC's infringement.

40. The TSMC Defendants have been placed on actual notice of the Asserted Patents. TSMC received actual notice of the Asserted Patents at least as early as August 2019 by way of a letter to TSMC dated August 24, 2019. Additionally, the filing of this Complaint also constitutes notice in accordance with 35 U.S.C. § 287.

41. After receiving actual notice of the Asserted Patents, TSMC has proceeded to make, use, test, design, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

42. TSMC has directly infringed, and continue to directly infringe, the Asserted Patents under 35 U.S.C. § 271(a) and (g) by one or more of making, using, selling and/or offering to sell, in this District and elsewhere in the United States, and importing into this District and elsewhere in the United States, certain infringing semiconductor devices, integrated circuits, and products containing the same including, but not limited to, semiconductor devices, integrated circuits, and products containing the same, which infringe, or were manufactured using processes that infringe, the Asserted Patents, as further described in detail in Counts I-VIII *infra* (collectively, “Accused Products”).

43. TSMC has also indirectly infringed, and continue to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) and (c). TSMC knew and intended to induce and contribute to the infringement of the Asserted Patents. The Accused Products, and the processes of manufacture of the Accused Products, have no substantial non-infringing use. After receiving actual notice of the Asserted Patents, the TSMC proceeded to actively induce, and materially contribute to, its customers’ infringement of the Asserted Patents by making, using, selling,

offering for sale, marketing, advertising, and/or importing semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents, and instructing customers to infringe the Asserted Patents.

44. Thus, TSMC has indirectly infringed, and continue to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) by actively inducing their customers to infringe the Asserted Patents by making, using, selling, offering for sale, marketing, advertising, and/or importing the Accused Products to their customers for use in downstream products that infringe, or were manufactured using processes that infringe, the Asserted Patents, and by instructing customers to infringe the Asserted Patents, as described in detail in Counts I-VIII *infra*. Additionally, TSMC have indirectly infringed, and continue to indirectly infringe the Asserted Patents under 35 U.S.C. § 271(c) by materially contributing to their own customers' infringement of the Asserted Patents by making, using, selling, offering for sale, advertising, marketing, and/or importing the Accused Products to their customers for use in downstream products that infringe, or which were manufactured using processes that infringe, the Asserted Patents, and by instructing customers to infringe the Asserted Patents, as described in detail in Counts I-VIII *infra*.

45. The Accused Products include, but are not limited to all TSMC semiconductor devices, integrated circuits, and products manufactured at 28 nanometer technology nodes and under including, but not limited to, semiconductor devices manufactured using TSMC 16 nanometer and smaller technology including TSMC's 16/12 nanometer technology (including TSMC's 16 nanometer Fin Field Effect Transistor ("FinFET") process, 16 nanometer FinFET Plus process, 16 nanometer FinFET Compact Technology, and 12 nanometer FinFET Compact Technology) ("16 Nanometer"), TSMC's 10 nanometer technology (including TSMC's 10 nanometer FinFET process) ("10 Nanometer"), TSMC's 7 nanometer technology (including



TSMC's 7 nanometer FinFET process) ("7 Nanometer"). Globalfoundries reserves the right to accuse any forthcoming TSMC technology, such as TSMC's 7 nanometer extreme ultraviolet lithography technology and TSMC's 5 nanometer technology.

46. TSMC's acts of infringement have caused damage to Plaintiff. Plaintiff is entitled to recover from TSMC the damages incurred by Plaintiff as a result of TSMC's wrongful acts.

#### NVIDIA

47. NVIDIA uses semiconductor devices manufactured by Taiwan Semiconductor Manufacturing Co., Ltd., TSMC North America, and TSMC Technology Inc. (collectively, "TSMC"). TSMC is a competing semiconductor foundry with manufacturing facilities located primarily in Hsinchu, Taiwan.

48. As set forth below, the Accused Products incorporate, without any license from Globalfoundries, many technologies developed by Globalfoundries and protected by patents owned by Globalfoundries. The importation of infringing articles into the U.S. from Greater China and elsewhere abroad directly harms Globalfoundries and its billions in U.S. investments in manufacturing. Globalfoundries respectfully seeks relief from this Court for NVIDIA's infringement.

49. NVIDIA made, had made, used, sold, offered for sale, imported, had imported, tested, designed, and/or marketed in the United States semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

50. NVIDIA has been placed on actual notice of the Asserted Patents. NVIDIA received actual notice of the Asserted Patents at least as early as August 2019 by way of a letter to NVIDIA dated August 24, 2019. Additionally, the filing of this Complaint also constitutes notice in accordance with 35 U.S.C. § 287.

51. After receiving actual notice of the Asserted Patents, NVIDIA proceeded to make, have made, use, test, design, sell, and/or offer to sell in this District and elsewhere in the United States, and import and/or have imported into this District and elsewhere in the United States, semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

52. NVIDIA has directly infringed, and continues to directly infringe, the Asserted Patents under 35 U.S.C. § 271(a) and (g) by one or more of making, using, selling and/or offering to sell, in this District and elsewhere in the United States, and importing into this District and elsewhere in the United States, certain infringing semiconductor devices, integrated circuits, and products containing the same including, but not limited to, semiconductor devices, integrated circuits, and products containing the same, which infringe, or were manufactured using processes that infringe, the Asserted Patents, as further described in detail in Counts I, III, V, and VII *infra* (collectively, “Accused Products”).

53. NVIDIA has also indirectly infringed, and continues to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) and (c). NVIDIA knew and intended to induce and contribute to the infringement of the Asserted Patents. The Accused Products, and the processes of manufacture of the Accused Products, have no substantial non-infringing use. After receiving actual notice of the Asserted Patents, NVIDIA proceeded to actively induce, and/or materially contribute to, TSMC’s infringement of the Asserted Patents by TSMC making, using, selling, offering for sale, marketing, advertising, and/or importing semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

54. NVIDIA has used TSMC as a major supplier of semiconductor devices for years, and chose TSMC as the exclusive manufacturer of one of NVIDIA's flagship graphics card, the GTX 2080 Ti.<sup>5</sup> NVIDIA confirmed in July 2019 that its next generation GPUs will continue to be produced at TSMC.<sup>6</sup>

55. Thus, NVIDIA has indirectly infringed, and continues to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) by actively inducing its suppliers to infringe the Asserted Patents by making, using, selling, offering for sale, marketing, advertising, and/or importing the Accused Products to their customers for use in downstream products that infringe, or were manufactured using processes that infringe, the Asserted Patents, and by instructing suppliers to infringe the Asserted Patents, as described in detail in Counts I, III, V, and VII *infra*. Additionally, NVIDIA has indirectly infringed, and continue to indirectly infringe the Asserted Patents under 35 U.S.C. § 271(c) by materially contributing to their own customers' infringement of the Asserted Patents by making, using, selling, offering for sale, advertising, marketing, and/or importing the Accused Products to their customers for use in downstream products that infringe, or which were manufactured using processes that infringe, the Asserted Patents, and by instructing suppliers to infringe the Asserted Patents, as described in detail in Counts I, III, V, and VII *infra*.

56. The Accused Products include, but are not limited to, NVIDIA's GeForce GTX 1060, NVIDIA Volta GV100, and any other NVIDIA product that incorporates any TSMC semiconductor devices, integrated circuits, and products manufactured at 28 nanometer technology nodes and under including, but not limited to, semiconductor devices manufactured using TSMC

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<sup>5</sup> "Nvidia Said to Chose TSMC Over Samsung For GPU Production," <https://www.cdrinfo.com/d7/content/nvidia-said-chose-tsmc-over-samsung-gpu-production>.

<sup>6</sup> "Update: Nvidia VP Says Next-Gen GPUs Will Be Made by TSMC and Samsung," <https://www.tomshardware.com/news/nvidia-ampere-gpu-graphics-card-samsung,39787.html>.

16 nanometer and smaller technology, including TSMC's 16/12 nanometer technology (including TSMC's 16 nanometer Fin Field Effect Transistor ("FinFET") process, 16 nanometer FinFET Plus process, 16 nanometer FinFET Compact Technology, and 12 nanometer FinFET Compact Technology) ("16 Nanometer"), TSMC's 10 nanometer technology (including TSMC's 10 nanometer FinFET process) ("10 Nanometer"), TSMC's 7 nanometer technology (including TSMC's 7 nanometer FinFET process) ("7 Nanometer"). Globalfoundries reserves the right to accuse any forthcoming NVIDIA products, such as NVIDIA's next generation graphics processing units.

57. NVIDIA's acts of infringement have caused damage to Plaintiff. Plaintiff is entitled to recover from NVIDIA the damages incurred by Plaintiff as a result of NVIDIA's wrongful acts.

#### Lenovo

58. Lenovo uses semiconductor devices manufactured by TSMC Co., Ltd., TSMC North America, and TSMC Technology Inc. (collectively, "TSMC"). TSMC is a competing semiconductor foundry with manufacturing facilities located primarily in Hsinchu, Taiwan.

59. As set forth below, the Accused Products incorporate, without any license from Globalfoundries, many technologies developed by Globalfoundries and protected by patents owned by Globalfoundries. The importation of infringing articles into the U.S. from Greater China and elsewhere abroad directly harms Globalfoundries and its billions in U.S. investments in manufacturing. Globalfoundries respectfully seeks relief from this Court for Lenovo's infringement.

60. Lenovo made, had made, used, sold, offered for sale, imported, had imported, tested, designed, and/or marketed in the United States semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

61. Lenovo has been placed on actual notice of the Asserted Patents. Lenovo received actual notice of the Asserted Patents at least as early as August 2019 by way of a letter to Lenovo dated August 24, 2019. Additionally, the filing of this Complaint also constitutes notice in accordance with 35 U.S.C. § 287.

62. After receiving actual notice of the Asserted Patents, Lenovo proceeded to make, have made, use, test, design, sell, and/or offer to sell in this District and elsewhere in the United States, and import and/or have imported into this District and elsewhere in the United States, semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

63. Lenovo has directly infringed, and continues to directly infringe, the Asserted Patents under 35 U.S.C. § 271(a) and (g) by one or more of making, using, selling and/or offering to sell, in this District and elsewhere in the United States, and importing into this District and elsewhere in the United States, certain infringing semiconductor devices, integrated circuits, and products containing the same including, but not limited to, semiconductor devices, integrated circuits, and products containing the same, which infringe, or were manufactured using processes that infringe, the Asserted Patents, as further described in detail in Counts I, III, V, and VII *infra* (collectively, “Accused Products”).

64. Lenovo has also indirectly infringed, and continues to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) and (c). Lenovo knew and intended to induce and contribute to the infringement of the Asserted Patents. The Accused Products, and the processes of manufacture of the Accused Products, have no substantial non-infringing use. After receiving actual notice of the Asserted Patents, Lenovo proceeded to actively induce, and/or materially contribute to, TSMC’s and NVIDIA’s infringement of the Asserted Patents by TSMC and/or

NVIDIA making, using, selling, offering for sale, marketing, advertising, and/or importing semiconductor devices, integrated circuits, and products containing the same that infringe, or were manufactured using processes that infringe, the Asserted Patents.

65. Thus, Lenovo has indirectly infringed, and continues to indirectly infringe, the Asserted Patents under 35 U.S.C. § 271(b) by actively inducing its suppliers to infringe the Asserted Patents by making, using, selling, offering for sale, marketing, advertising, and/or importing the Accused Products to their customers for use in downstream products that infringe, or were manufactured using processes that infringe, the Asserted Patents, and by instructing suppliers to infringe the Asserted Patents, as described in detail in Counts I, III, V, and VII *infra*. Additionally, Lenovo has indirectly infringed, and continue to indirectly infringe the Asserted Patents under 35 U.S.C. § 271(c) by materially contributing to their own customers' infringement of the Asserted Patents by making, using, selling, offering for sale, advertising, marketing, and/or importing the Accused Products to their customers for use in downstream products that infringe, or which were manufactured using processes that infringe, the Asserted Patents, and by instructing suppliers to infringe the Asserted Patents, as described in detail in Counts I, III, V, and VII *infra*.

66. The Accused Products include, but are not limited to, Lenovo Thinksystem NVIDIA Quadro GV100 32GB, and any other Lenovo product that incorporates any TSMC semiconductor devices, integrated circuits, and products manufactured at 7-28 nanometer technology nodes including, but not limited to, semiconductor devices manufactured using TSMC 28 nanometer and smaller technology includes TSMC's 28 nanometer technology (including TSMC's High-k Metal Gate gate-last technology and high-performance compact technology) ("28 Nanometer"), TSMC's 22 nanometer technology (including TSMC's 22 nanometer ultra-low power, 22 nanometer ultra-low leakage, and 22 nanometer ultra-low leakage static random access

memory technologies) (“22 Nanometer”), TSMC’s 20 nanometer technology (“20 Nanometer”), TSMC’s 16/12 nanometer technology (including TSMC’s 16 nanometer Fin Field Effect Transistor (“FinFET”) process, 16 nanometer FinFET Plus process, 16 nanometer FinFET Compact Technology, and 12 nanometer FinFET Compact Technology) (“16 Nanometer”), TSMC’s 10 nanometer technology (including TSMC’s 10 nanometer FinFET process) (“10 Nanometer”), TSMC’s 7 nanometer technology (including TSMC’s 7 nanometer FinFET process) (“7 Nanometer”). Globalfoundries reserves the right to accuse any forthcoming Lenovo products, such as Lenovo’s next generation laptops, tablets, and wearable devices.

67. Lenovo’s acts of infringement have caused damage to Plaintiff. Plaintiff is entitled to recover from Lenovo the damages incurred by Plaintiff as a result of Lenovo’s wrongful acts.

**COUNT I**  
**(Defendants’ Infringement of the ’178 Patent)**

68. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

69. On information and belief, all Defendants have infringed and continue to infringe and/or have induced and/or contributed to infringement of one or more claims of the ’178 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States and/or using, and/or selling, and/or offering for sale in the United States, without authority or license, integrated circuits manufactured by TSMC using, for example, TSMC’s 16 Nanometer and smaller technology and products containing these integrated circuits (collectively, the “’178 Accused Products”), in violation of 35 U.S.C. § 271.

70. On information and belief, TSMC has directly infringed and continues to infringe at least claim 1 of the ’178 Patent literally or under the doctrine of equivalents, by importing into the United States, and/or using, and/or selling, and/or offering to sell in the United States, without

authority or license, '178 Accused Products, in violation of 35 U.S.C. § 271(a) and (g). On information and belief, TSMC uses the '178 Accused Products through at least testing, evaluations, and demonstrations. For example, as part of its sales and customer-service activities, TSMC performs infringing demonstrations, evaluations, and testing of the Accused Products at customer sites in the United States, at TSMC's sites in the United States, and at TSMC's annual Technology Symposium and related workshops. On information and belief, TSMC imports the '178 Accused Products for the aforementioned uses. On information and belief, TSMC also imports the '178 Accused Products through its CyberShuttle and MOSIS MPW services. For example, TSMC imports the '178 Accused Products for distribution to CyberShuttle customers located in the United States and imports the '178 Accused Products to MOSIS in Marina Del Ray, California. On information and belief, TSMC sells the '178 Accused Products. For example, TSMC sells '178 Accused Products to customers in the United States through its CyberShuttle MPW service. On information and belief, TSMC offers the Accused Products for sale. For example, TSMC engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

71. The '178 Accused Products are manufactured by a process including all of the limitations of at least claim 1 of the '178 Patent. Specifically, claim 1 of the '178 Patent claims a method comprising: (i) providing at least one word line structure, at least one ground line structure, and at least one power line structure; (ii) providing at least one bit line structure proximate the at least one word line structure, the at least one ground line structure, and the at least one power line structure; and the at least one word line structure, the at least one ground line structure, the at least one power line structure, and the at least one bit line structure together providing at least one double patterned metal layer structure, connecting the at least one double patterned metal layer



structure to active region contacts and gate contacts, wherein the at least one word line structure comprises a first tip edge and a first side edge, and the at least one ground line structure comprises a second tip edge and a second side edge, with the first tip edge perpendicular to the first side edge and the second tip edge perpendicular to the second side edge, and the first side edge facing the second side edge; and (iv) providing each of the at least one bit line structures with a third tip edge and a third side edge, wherein the first and second tip edges are parallel to the third side edge.

72. The '178 Accused Products are manufactured, for example, by TSMC using its 16 Nanometer FinFET manufacturing process. The 16 Nanometer manufacturing process provides at least one word line, ground line, power line, and bit line structure in, for example, an SRAM cell. The bit line structure is proximate the word line, ground line structure, and power line structure.

73. Furthermore, the word line structure provided, for example, by TSMC's 16 Nanometer manufacturing process, has a first tip edge and a first side edge. TSMC's 16 Nanometer manufacturing process also provides a second tip edge and a second side edge associated with the ground line structure. The first tip edge is perpendicular to the first side edge and the second tip edge is perpendicular to the second side edge. The first side edge faces the second side edge. Each of the bit line structures has a third tip edge and a third side edge, wherein the first and second tip edges are parallel to the third side edge.

74. TSMC's 16 Nanometer manufacturing process provides double patterning in the metal layers, at least, for example, in the Metal 1 layer. The word line, ground line, power line, and bit line structure are provided together by the TSMC 16 Nanometer manufacturing process in the Metal 1 layer. TSMC's 16 Nanometer manufacturing process connects the double patterned

metal layer structure, such as for example, the Metal 1 layer, to active region contacts and gate contacts.

75. On information and belief, the '178 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

76. On information and belief, TSMC uses, sells, offers for sale, and/or imports TSMC Accused Products in the United States. For example, on information and belief, TSMC: (a) tests, evaluates, and demonstrates TSMC Accused Products in the United States; and (b) sells, offers for sale, and imports in the United States TSMC Accused Products to one or more other parties, including Defendants NVIDIA and Lenovo.

77. Upon information and belief, TSMC had, and has, knowledge of the '178 Patent. For example, TSMC has knowledge of the '178 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '178 Patent by way of a notice letter dated August 24, 2019.

78. On information and belief, TSMC contributes to and induces direct infringement by others, including TSMC's customers, Defendants NVIDIA, Lenovo, and consumers and users of the TSMC articles and the devices into which they are incorporated. Such directly infringing acts by these others include importation, sales, use, and offer for sale of the foregoing articles that are made by methods covered by the '178 Patent.

79. Upon information and belief, TSMC knowingly induced and induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. Upon information and belief, TSMC made the TSMC Accused Products such as to result in infringement of the '178 Patent if made, used, sold, or offered for sale, or imported into the United

States. Upon information and belief, TSMC provided directly or indirectly the TSMC Accused Products to the foregoing other direct infringers knowing and intending that those others would use, sell, offer for sale, and import into the United States those TSMC Accused Products or products incorporating them, thereby directly infringing the '178 Patent. TSMC also contributes to the foregoing infringement by others because the TSMC Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, TSMC is contributing to and/or inducing the infringement of the '178 Patent.

80. Other entities directly infringe the '178 Patent by making, using, offering to sell, and selling at least some '178 Accused Products in the United States and by importing '178 Accused Products into the United States. For example, TSMC's customer Defendant NVIDIA has infringed and continues to infringe one or more claims of the '178 Patent, including at least claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(a) by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, semiconductor devices, including but not limited to NVIDIA's Volta GV100, and any other NVIDIA product that incorporates any TSMC semiconductor devices, integrated circuits, and products manufactured at 28 nanometer technology nodes and under (the "NVIDIA '178 Accused Products"). On information and belief, NVIDIA imports the NVIDIA '178 Accused Products into the United States for sales and distribution to customers located in the United States. On information and belief, NVIDIA sells NVIDIA '178 Accused Products in the United States. For example, NVIDIA hires permanent sales personnel located throughout the United States. In particular, NVIDIA has at least 19 locations throughout the United States. *See* <https://www.nvidia.com/en-us/contact/>. On information and belief, each of these offices engages

in sales activities. On information and belief, these sales activities include direct sales by NVIDIA to original equipment manufacturers, including original equipment manufacturers based in the United States. On information and belief, NVIDIA offers the NVIDIA '178 Accused Products for sale in the United States. For example, NVIDIA engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

81. On information and belief, Defendant NVIDIA contributes to and induces direct infringement by others, including TSMC. For example, TSMC's directly infringing acts that are induced and contributed to by NVIDIA includes TSMC's sale and offer to sell in the United States, and importation into the United States, of TSMC Accused Products that are manufactured using processes that infringe the '178 Patent.

82. NVIDIA had, and has, knowledge of the '178 Patent. For example, NVIDIA has knowledge of the '178 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '178 Patent by way of a notice letter dated August 24, 2019.

83. NVIDIA knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, NVIDIA induces TSMC's direct infringement by contracting with and encouraging TSMC to offer to sell, sell, and import in the United States TSMC Accused Products that are manufactured using processes that infringe the '178 Patent, including Accused TSMC Products that are incorporated into NVIDIA Accused Products. NVIDIA knows, or should have known, that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint and the August 24, 2019 notice letter. Defendant NVIDIA also contributes to the foregoing infringement by others because the Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and

claim. Thus, on information and belief, NVIDIA is contributing to and/or inducing the infringement of the '178 Patent.

84. Defendant NVIDIA's customers, for example, Defendant Lenovo have also infringed and continue to infringe claim 1 of the '178 Patent literally or under the doctrine of equivalents at least under 35 U.S.C. § 271(a) by importing into the United States and/or using, selling, and/or offering for sale in the United States, without any authority or license, graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, that includes NVIDIA '178 Accused Products. These products are offered for sale at various retail locations throughout the United States.

85. On information and belief, Lenovo imports at least graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, containing NVIDIA '178 Accused Products into the United States for sales and distribution to customers located in the United States. For example, on information and belief, Lenovo through itself or its affiliates, directly or indirectly, imports such graphics cards to warehouses and distribution centers for sales throughout the United States. On information and belief, Lenovo offers such graphics cards for sale in the United States. For example, Lenovo engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers and distributors.

86. On information and belief, Defendant Lenovo is unlawfully importing into the United States, and/or selling within the United States, downstream products that include Accused TSMC Semiconductor Devices and Lenovo Devices ("Accused OEM Downstream Devices"). The Accused OEM Downstream Devices are manufactured using processes that infringe the '178 Patent, directly or indirectly, literally or under the doctrine of equivalents.

87. The methods used to make the Accused OEM Downstream Devices fall within the scope of and include, either literally under the doctrine of equivalents, all of the elements of the asserted claims of the '178 Patent.

88. On information and belief, the Downstream OEM Defendant Lenovo uses, sells, and offers for sale in the United States, and imports into the United States, the Accused OEM Downstream Devices. The Downstream OEM Defendant Lenovo also indirectly infringes the Asserted Patents because it contributes to and induces direct infringement by others, including chip company TSMC.

89. The Downstream OEM Defendant Lenovo had and has knowledge of the '178 Patent. For example, Lenovo has knowledge of '178 Patent as a result of the filing and/or service of this Complaint. Additionally, Lenovo had actual knowledge of the '178 Patent by way of a notice letter dated August 24, 2019.

90. Lenovo knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, Lenovo induces TSMC's direct infringement by contracting with and encouraging TSMC to sell and import in the United States the Accused TSMC Devices, including Accused TSMC Devices that are incorporated into Accused Lenovo Devices. Lenovo knows or should know that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint. Also, for example, Lenovo also contributes to the foregoing infringement by others because the Accused TSMC Semiconductor Devices and Accused Lenovo Devices have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, Lenovo is contributing to and/or inducing the infringement of the '178 Patent.

91. Globalfoundries has suffered and continues to suffer damages as a result of Defendants' infringement of the '178 Patent.

92. Defendants' continuing acts of infringement are a basis of consumer demand for the '178 Accused Products. Defendants' continuing acts of infringement are therefore irreparably harming and causing damage to Globalfoundries, for which Globalfoundries has no adequate remedy at law, and will continue to suffer such irreparable injury unless Defendants' continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Globalfoundries should an injunction not issue. The public interest would be served by issuance of an injunction.

**COUNT II**  
**(TSMC Defendants' Willful Infringement of the '178 Patent)**

93. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

94. The TSMC Defendants have infringed and/or do willfully infringe the '178 Patent.

95. The TSMC Defendants received actual notice of the '178 Patent at least as early as August 2019 by way a letter to TSMC dated August 24, 2019. After receiving such actual notice of the '178 Patent, the TSMC Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

96. On information and belief, the TSMC Defendants engaged in such activities despite an objectively high likelihood that its actions constituted infringement of valid patents, including the '178 Patent. The TSMC Defendants knew and should have known that their actions would cause direct and indirect infringement of the '178 Patent.

**COUNT III**  
**(Defendants' Infringement of the '643 Patent)**

97. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

98. On information and belief, all Defendants have infringed and continue to infringe and/or induce and/or contributed to infringement of one or more claims of the '643 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, integrated circuits manufactured by TSMC using, for example, TSMC's 16 Nanometer and smaller technology and products containing these integrated circuits (collectively, the "'643 Accused Products"), in violation of 35 U.S.C. § 271.

99. On information and belief, TSMC has directly infringed and continues to infringe one or more claims of the '643 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States, and/or using, and/or selling, and/or offering to sell in the United States, without authority or license, '643 Accused Products, in violation of 35 U.S.C. § 271(a). On information and belief, TSMC uses the '643 Accused Products through at least testing, evaluations, and demonstrations. For example, as part of its sales and customer-service activities TSMC performs infringing demonstrations, evaluations, and testing of the Accused Products at customer sites in the United States, at TSMC's sites in the United States, and at TSMC's annual Technology Symposium and related workshops. On information and belief, TSMC imports the '643 Accused Products for the aforementioned uses. On information and belief, TSMC also imports the '643 Accused Products through its CyberShuttle and MOSIS MPW services. For example, TSMC imports the '643 Accused Products for distribution to CyberShuttle customers located in the United States and imports the '643 Accused Products to MOSIS in Marina



Del Ray, California. On information and belief, TSMC sells the '643 Accused Products. For example, TSMC sells '643 Accused Products to customers in the United States through its CyberShuttle MPW service. On information and belief, TSMC offers the '643 Accused Products for sale. For example, TSMC engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

100. The '643 Accused Products meet all of the limitations of at least claim 1 of the '643 Patent. Specifically, claim 1 of the '643 Patent claims a device comprising: (i) at least one word line structure having a first tip edge and a first side edge; (ii) at least one ground line structure having a second tip edge and a second side edge; (iii) at least one power line structure; (iv) and at least one bit line structure proximate the at least one word line structure, the at least one ground line structure, and the at least one power line structure; (v) the at least one word line structure, the at least one ground line structure, the at least one power line structure, and the at least one bit line structure together providing at least one double patterned metal layer structure, wherein the at least one double patterned metal layer structure is connected to active region contacts and gate contacts; (vi) wherein the first side edge faces the second side edge; (vii) wherein the first tip edge is perpendicular to the first side edge and the second tip edge is perpendicular to the second side edge; and (viii) wherein the bit line structure has a third tip edge and a third side edge, and the first and second tip edges are parallel to the third side edge.

101. The '643 Accused Products are, or incorporate, for example, semiconductor devices manufactured by TSMC using its 16 Nanometer FinFET manufacturing process, include at least one word line structure having a first tip edge and a first side edge. Such semiconductor devices also have at least one ground line structure having a second tip edge and a second side edge. Additionally, such semiconductor structures have at least one power line structure and at

least one bit line structure proximate the word line, ground line, and the power line structures. The first side edge faces the second side edge. The first tip edge is perpendicular to the first side edge and the second tip edge is perpendicular to the second side edge. Furthermore, the bit line structure has a third tip edge and a third side edge, and the first and second tip edges are parallel to the third side edge.

102. Together, the word line, ground line, power line, and the bit line structure provide at least one double patterned metal layer structure. The TSMC 16 nm manufacturing process, for example, provides the word line, ground line, power line, and the bit line on a single, double-patterned, Metal 1 layer structure. This Metal 1 layer structure is connected to active region contacts and gate contacts.

103. On information and belief, TSMC uses, sells, offers for sale, and/or imports TSMC Accused Products in the United States. For example, on information and belief, TSMC: (a) tests, evaluates, and demonstrates TSMC Accused Products in the United States; and (b) sells, offers for sale, and imports in the United States TSMC Accused Products to one or more other parties, including Defendants NVIDIA and Lenovo.

104. Upon information and belief, TSMC had, and has, knowledge of the '643 Patent. For example, TSMC has knowledge of the '643 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '643 Patent by way of a notice letter dated August 24, 2019.

105. On information and belief, TSMC contributes to and induces direct infringement by others, including TSMC's customers, Defendants NVIDIA, Lenovo, and consumers and users of the TSMC articles and the devices into which they are incorporated. Such directly infringing

acts by these others include importation, sales, use, and offer for sale of the foregoing articles that are covered by the claims of the '643 Patent.

106. Upon information and belief, TSMC knowingly induced and induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. Upon information and belief, TSMC made the TSMC Accused Products such as to result in infringement of the '643 Patent if made, used, sold, or offered for sale, or imported into the United States. Upon information and belief, TSMC provided directly or indirectly the TSMC Accused Products to the foregoing other direct infringers knowing and intending that those others would use, sell, offer for sale, and import into the United States those TSMC Accused Products or products incorporating them, thereby directly infringing the '643 Patent. TSMC also contributes to the foregoing infringement by others because the TSMC Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, TSMC is contributing to and/or inducing the infringement of the '643 Patent.

107. Other entities directly infringe the '643 Patent by making, using, offering to sell, and selling at least some '643 Accused Products in the United States and by importing '643 Accused Products into the United States. For example, TSMC's customer Defendant NVIDIA has infringed and continues to infringe one or more claims of the '643 Patent, including at least claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(a) by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, semiconductor devices, including but not limited to NVIDIA's Volta GV100, fabricated using TSMC's 16 Nanometer process (the "NVIDIA '643 Accused Products"). On information and belief, NVIDIA imports the NVIDIA '643 Accused Products into the United

States for sales and distribution to customers located in the United States. On information and belief, NVIDIA sells NVIDIA '643 Accused Products in the United States. For example, NVIDIA hires permanent sales personnel located throughout the United States. In particular, NVIDIA has at least 19 locations throughout the United States. *See* <https://www.nvidia.com/en-us/contact/>. On information and belief, each of these offices engages in sales activities. On information and belief, these sales activities include direct sales by NVIDIA to original equipment manufacturers, including original equipment manufacturers based in the United States. On information and belief, NVIDIA offers the NVIDIA '643 Accused Products for sale in the United States. For example, NVIDIA engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

108. On information and belief, Defendant NVIDIA contributes to and induces direct infringement by others, including TSMC. For example, TSMC's directly infringing acts that are induced and contributed to by NVIDIA includes TSMC's sale and offer to sell in the United States, and importation into the United States, of TSMC Accused Products that infringe the '643 Patent.

109. NVIDIA had, and has, knowledge of the '643 Patent. For example, NVIDIA has knowledge of the '643 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '643 Patent by way of a notice letter dated August 24, 2019.

110. NVIDIA knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, NVIDIA induces TSMC's direct infringement by contracting with and encouraging TSMC to offer to sell, sell, and import in the United States TSMC Accused Products that infringe the '643 Patent, including Accused TSMC Products that are incorporated into NVIDIA Accused Products. NVIDIA knows, or should have known, that these induced acts directly infringe the Asserted Patents because of, for example, the

infringement allegations and evidence provided in connection with this Complaint and the August 24, 2019 notice letter. Defendant NVIDIA also contributes to the foregoing infringement by others because the Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, NVIDIA is contributing to and/or inducing the infringement of the '643 Patent.

111. Defendant NVIDIA's customers, for example, Defendant Lenovo have also infringed and continue to infringe claim 1 of the '643 Patent literally or under the doctrine of equivalents at least under 35 U.S.C. § 271(a) by importing into the United States and/or using, selling, and/or offering for sale in the United States, without any authority or license, graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, that includes NVIDIA '643 Accused Products. These products are offered for sale at various retail locations throughout the United States.

112. On information and belief, Lenovo imports at least graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, containing NVIDIA '643 Accused Products into the United States for sales and distribution to customers located in the United States. For example, on information and belief, Lenovo through itself or its affiliates, directly or indirectly, imports such graphics cards to warehouses and distribution centers for sales throughout the United States. On information and belief, Lenovo offers such graphics cards for sale in the United States. For example, Lenovo engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers and distributors.

113. On information and belief, Defendant Lenovo is unlawfully importing into the United States, and/or selling within the United States, downstream products that include Accused TSMC Semiconductor Devices and Lenovo Devices ("Accused OEM Downstream Devices").

The Accused OEM Downstream Devices infringe the '643 Patent, directly or indirectly, literally or under the doctrine of equivalents.

114. The Accused OEM Downstream Devices fall within the scope of and include, either literally under the doctrine of equivalents, all of the elements the asserted claims of the '643 Patent.

115. On information and belief, the Downstream OEM Defendant Lenovo uses, sells, and offers for sale in the United States, and imports into the United States, the Accused OEM Downstream Devices. The Downstream OEM Defendant Lenovo also indirectly infringes the Asserted Patents because it contributes to and induces direct infringement by others, including chip company TSMC.

116. The Downstream OEM Defendant Lenovo had and has knowledge of the '643 Patent. For example, Lenovo has knowledge of '643 Patent as a result of the filing and/or service of this Complaint. Additionally, Lenovo had actual knowledge of the '643 Patent by way of a notice letter dated August 24, 2019.

117. Lenovo knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, Lenovo induces TSMC's direct infringement by contracting with and encouraging TSMC to sell and import in the United States the Accused TSMC Devices, including Accused TSMC Devices that are incorporated into Accused Lenovo Devices. Lenovo knows or should know that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint. Also, for example, Lenovo also contributes to the foregoing infringement by others because the Accused TSMC Semiconductor Devices and Accused Lenovo Devices have no substantial-non-infringing uses and are a material part of the invention of each

Asserted Patent and claim. Thus, on information and belief, Lenovo is contributing to and/or inducing the infringement of the '643 Patent.

118. Globalfoundries has suffered and continues to suffer damages as a result of Defendants' infringement of the '643 Patent.

119. Defendants' continuing acts of infringement are a basis of consumer demand for the '643 Accused Products. Defendants' continuing acts of infringement are therefore irreparably harming and causing damage to Globalfoundries, for which Globalfoundries has no adequate remedy at law, and will continue to suffer such irreparable injury unless Defendants' continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Globalfoundries should an injunction not issue. The public interest would be served by issuance of an injunction.

**COUNT IV**  
**(TSMC Defendants' Willful Infringement of the '643 Patent)**

120. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

121. The TSMC Defendants have infringed and/or do willfully infringe the '643 Patent.

122. The TSMC Defendants received actual notice of the '643 Patent at least as early as August 2019 by way a letter to TSMC dated August 24, 2019. After receiving such actual notice of the '643 Patent, the TSMC Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

123. On information and belief, the TSMC Defendants engaged in such activities despite an objectively high likelihood that its actions constituted infringement of valid patents, including

the '643 Patent. The TSMC Defendants knew and should have known that their actions would cause direct and indirect infringement of the '643 Patent.

**COUNT V**  
**(Defendants' Infringement of the '357 Patent)**

124. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

125. On information and belief, all Defendants have infringed and continue to infringe and/or induce and/or contributed to infringement of one or more claims of the '357 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, integrated circuits manufactured by TSMC using, for example, TSMC's 16 Nanometer and smaller technology and products containing these integrated circuits (collectively, the "'357 Accused Products"), in violation of 35 U.S.C. § 271.

126. On information and belief, TSMC has directly infringed and continues to infringe one or more claims of the '357 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States, and/or using, and/or selling, and/or offering to sell in the United States, without authority or license, '357 Accused Products, in violation of 35 U.S.C. § 271(a). On information and belief, TSMC uses the '357 Accused Products through at least testing, evaluations, and demonstrations. For example, as part of its sales and customer-service activities TSMC performs infringing demonstrations, evaluations, and testing of the Accused Products at customer sites in the United States, at TSMC's sites in the United States, and at TSMC's annual Technology Symposium and related workshops. On information and belief, TSMC imports the '357 Accused Products for the aforementioned uses. On information and belief, TSMC also imports the '357 Accused Products through its CyberShuttle and MOSIS MPW



services. For example, TSMC imports the '357 Accused Products for distribution to CyberShuttle customers located in the United States and imports the '357 Accused Products to MOSIS in Marina Del Ray, California. On information and belief, TSMC sells the '357 Accused Products. For example, TSMC sells '357 Accused Products to customers in the United States through its CyberShuttle MPW service. On information and belief, TSMC offers the '357 Accused Products for sale. For example, TSMC engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

127. The '357 Accused Products meet all of the limitations of at least claim 1 of the '357 Patent. Specifically, claim 1 of the '357 Patent claims a semiconductor structure having at least one fin-type field effect transistor (FinFET), said semiconductor structure comprising: (i) a substrate; (ii) at least one first fin extending from said substrate and having first opposing sides; (iii) at least one second fin extending from said substrate and having second opposing sides, wherein said first fin and said second fin have different thicknesses; and (iv) a first gate dielectric covering said first opposing sides of said first fin; and a second gate dielectric covering said second opposing sides of said second fin; wherein said first gate dielectric has a first thickness and said second gate dielectric has a second thickness and wherein said first thickness is different from said second thickness.

128. The '357 Accused Products are, or incorporate, for example, semiconductor devices manufactured by TSMC using its 16 Nanometer FinFET manufacturing process, have a semiconductor structure comprising at least one fin-type field effect transistor (FinFET).

129. Semiconductor structures made using TSMC's 16 Nanometer process have a substrate and at least one first fin extends from the substrate and has first opposing sides. Additionally, semiconductor structures made, for example, using TSMC's 16 Nanometer process,

have at least one second fin extends from the substrate and has second opposing sides. Based, for example, on TSMC's 16 Nanometer process, the first fin and the second fin to have different thicknesses.

130. Semiconductor structures made, for example, using TSMC's 16 Nanometer process also have a first gate dielectric covering the first opposing sides of the first fin and a second gate dielectric covering the second opposing sides of the second fin. Based on TSMC's 16 Nanometer process, the first gate dielectric has a first thickness and the second gate dielectric has a second thickness different from the first thickness.

131. On information and belief, TSMC uses, sells, offers for sale, and/or imports TSMC Accused Products in the United States. For example, on information and belief, TSMC: (a) tests, evaluates, and demonstrates TSMC Accused Products in the United States; and (b) sells, offers for sale, and imports in the United States TSMC Accused Products to one or more other parties, including Defendants NVIDIA and Lenovo.

132. Upon information and belief, TSMC had, and has, knowledge of the '357 Patent. For example, TSMC has knowledge of the '357 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '357 Patent by way of a notice letter dated August 24, 2019.

133. On information and belief, TSMC contributes to and induces direct infringement by others, including TSMC's customers, Defendants NVIDIA, Lenovo, and consumers and users of the TSMC articles and the devices into which they are incorporated. Such directly infringing acts by these others include importation, sales, use, and offer for sale of the foregoing articles that are made by methods covered by the '357 Patent.

134. Upon information and belief, TSMC knowingly induced and induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. Upon information and belief, TSMC made the TSMC Accused Products such as to result in infringement of the '357 Patent if made, used, sold, or offered for sale, or imported into the United States. Upon information and belief, TSMC provided directly or indirectly the TSMC Accused Products to the foregoing other direct infringers knowing and intending that those others would use, sell, offer for sale, and import into the United States those TSMC Accused Products or products incorporating them, thereby directly infringing the '357 Patent. TSMC also contributes to the foregoing infringement by others because the TSMC Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, TSMC is contributing to and/or inducing the infringement of the '357 Patent.

135. Other entities directly infringe the '357 Patent by making, using, offering to sell, and selling at least some '357 Accused Products in the United States and by importing '357 Accused Products into the United States. For example, TSMC's customer Defendant NVIDIA has infringed and continues to infringe one or more claims of the '357 Patent, including at least claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(a) by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, semiconductor devices, including but not limited to NVIDIA's Volta GV100, fabricated using TSMC's 16 Nanometer process (the "NVIDIA '357 Accused Products"). On information and belief, NVIDIA imports the NVIDIA '357 Accused Products into the United States for sales and distribution to customers located in the United States. On information and belief, NVIDIA sells NVIDIA '357 Accused Products in the United States. For example, NVIDIA

hires permanent sales personnel located throughout the United States. In particular, NVIDIA has at least 19 locations throughout the United States. *See* <https://www.nvidia.com/en-us/contact/>. On information and belief, each of these offices engages in sales activities. On information and belief, these sales activities include direct sales by NVIDIA to original equipment manufacturers, including original equipment manufacturers based in the United States. On information and belief, NVIDIA offers the NVIDIA '357 Accused Products for sale in the United States. For example, NVIDIA engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

136. On information and belief, Defendant NVIDIA contributes to and induces direct infringement by others, including TSMC. For example, TSMC's directly infringing acts that are induced and contributed to by NVIDIA includes TSMC's sale and offer to sell in the United States, and importation into the United States, of TSMC Accused Products that are manufactured using processes that infringe the '357 Patent.

137. NVIDIA had, and has, knowledge of the '357 Patent. For example, NVIDIA has knowledge of the '357 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '357 Patent by way of a notice letter dated August 24, 2019.

138. NVIDIA knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, NVIDIA induces TSMC's direct infringement by contracting with and encouraging TSMC to offer to sell, sell, and import in the United States TSMC Accused Products that are manufactured using processes that infringe the '357 Patent, including Accused TSMC Products that are incorporated into NVIDIA Accused Products. NVIDIA knows, or should have known, that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in

connection with this Complaint and the August 24, 2019 notice letter. Defendant NVIDIA also contributes to the foregoing infringement by others because the Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, NVIDIA is contributing to and/or inducing the infringement of the '357 Patent.

139. Defendant NVIDIA's customers, for example, Defendant Lenovo have also infringed and continue to infringe claim 1 of the '357 Patent literally or under the doctrine of equivalents at least under 35 U.S.C. § 271(a) by importing into the United States and/or using, selling, and/or offering for sale in the United States, without any authority or license, graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, that include NVIDIA '357 Accused Products. These products are offered for sale at various retail locations throughout the United States.

140. On information and belief, Lenovo imports at least graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, containing NVIDIA '357 Accused Products into the United States for sales and distribution to customers located in the United States. For example, on information and belief, Lenovo through itself or its affiliates, directly or indirectly, imports such graphics cards to warehouses and distribution centers for sales throughout the United States. On information and belief, Lenovo offers such graphics cards for sale in the United States. For example, Lenovo engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers and distributors.

141. On information and belief, Defendant Lenovo is unlawfully importing into the United States, and/or selling within the United States, downstream products that include Accused TSMC Semiconductor Devices and Lenovo Devices ("Accused OEM Downstream Devices").

The Accused OEM Downstream Devices are manufactured using processes that infringe the '357 Patent, directly or indirectly, literally or under the doctrine of equivalents.

142. The methods used to make the Accused OEM Downstream Devices fall within the scope of and include, either literally under the doctrine of equivalents, all of the elements of the asserted claims of the '357 Patent.

143. On information and belief, the Downstream OEM Defendant Lenovo uses, sells, and offers for sale in the United States, and imports into the United States, the Accused OEM Downstream Devices. The Downstream OEM Defendant Lenovo also indirectly infringes the Asserted Patents because it contributes to and induces direct infringement by others, including chip company TSMC.

144. The Downstream OEM Defendant Lenovo had and has knowledge of the '357 Patent. For example, Lenovo has knowledge of '357 Patent as a result of the filing and/or service of this Complaint. Additionally, Lenovo had actual knowledge of the '357 Patent by way of a notice letter dated August 24, 2019.

145. Lenovo knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, Lenovo induces TSMC's direct infringement by contracting with and encouraging TSMC to sell and import in the United States the Accused TSMC Devices, including Accused TSMC Devices that are incorporated into Accused Lenovo Devices. Lenovo knows or should know that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint. Also, for example, Lenovo also contributes to the foregoing infringement by others because the Accused TSMC Semiconductor Devices and Accused Lenovo Devices have no substantial-non-infringing uses and are a material part of the invention of each

Asserted Patent and claim. Thus, on information and belief, Lenovo is contributing to and/or inducing the infringement of the '357 Patent.

146. Globalfoundries has suffered and continues to suffer damages as a result of Defendants' infringement of the '357 Patent.

147. Defendants' continuing acts of infringement are a basis of consumer demand for the '357 Accused Products. Defendants' continuing acts of infringement are therefore irreparably harming and causing damage to Globalfoundries, for which Globalfoundries has no adequate remedy at law, and will continue to suffer such irreparable injury unless Defendants' continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are less than those faced by Globalfoundries should an injunction not issue. The public interest would be served by issuance of an injunction.

**COUNT VI**  
**(TSMC Defendants' Willful Infringement of the '357 Patent)**

148. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

149. The TSMC Defendants have infringed and/or do willfully infringe the '357 Patent.

150. The TSMC Defendants received actual notice of the '357 Patent at least as early as August 2019 by way a letter to TSMC dated August 24, 2019. After receiving such actual notice of the '357 Patent, the TSMC Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

151. On information and belief, the TSMC Defendants engaged in such activities despite an objectively high likelihood that its actions constituted infringement of valid patents, including

the '357 Patent. The TSMC Defendants knew and should have known that their actions would cause direct and indirect infringement of the '357 Patent.

**COUNT VII**  
**(Defendants' Infringement of the '877 Patent)**

152. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

153. On information and belief, all Defendants have infringed and continue to infringe and/or have induced and/or contributed to infringement of one or more claims of the '877 Patent, including at least claim 1, literally or under the doctrine of equivalents, by importing into the United States and/or using, and/or selling, and/or offering for sale in the United States, without authority or license, integrated circuits manufactured by TSMC using, for example, TSMC's 16 Nanometer and smaller technology and products containing these integrated circuits (collectively, the "'877 Accused Products"), in violation of 35 U.S.C. § 271.

154. On information and belief, TSMC has directly infringed and continues to infringe at least claim 1 of the '877 Patent literally or under the doctrine of equivalents, by importing into the United States, and/or using, and/or selling, and/or offering to sell in the United States, without authority or license, '877 Accused Products, in violation of 35 U.S.C. § 271(g). On information and belief, TSMC uses the '877 Accused Products through at least testing, evaluations, and demonstrations. For example, as part of its sales and customer-service activities TSMC performs infringing demonstrations, evaluations, and testing of the Accused Products at customer sites in the United States, at TSMC's sites in the United States, and at TSMC's annual Technology Symposium and related workshops. On information and belief, TSMC imports the '877 Accused Products for the aforementioned uses. On information and belief, TSMC also imports the '877 Accused Products through its CyberShuttle and MOSIS MPW services. For example, TSMC



imports the '877 Accused Products for distribution to CyberShuttle customers located in the United States and imports the '877 Accused Products to MOSIS in Marina Del Ray, California. On information and belief, TSMC sells the '877 Accused Products. For example, TSMC sells '877 Accused Products to customers in the United States through its CyberShuttle MPW service. On information and belief, TSMC offers the Accused Products for sale. For example, TSMC engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

155. The '877 Accused Products are manufactured by a process including all of the limitations of at least claim 1 of the '877 Patent. Specifically, claim 1 of the '877 Patent claims a method of forming a CMOS device, said method comprising: (i) forming at least one isolation region in a semiconductor substrate to provide at least one first active region and at least one second active region; (ii) forming a gate structure extending across said at least one isolation region and spanning from said at least one first active region to said at least one second active region, wherein said gate structure includes at least one gate dielectric layer, at least one gate conductor layer, and at least one dielectric cap layer; (iii) forming a first source region and a first drain region of a first conductivity type on opposing sides of said gate structure in said at least one first active region, and a second source region and a second drain region of a second conductivity type on opposing sides of said gate structure in said at least one second active region; (iv) forming an opening in a portion of said at least one dielectric cap layer to expose a contact portion of said at least one gate conductor layer over said at least one isolation region, wherein a remaining portion of said at least one dielectric cap layer is present over said at least one first active region and said at least one second active region; and (v) forming an interconnect in direct contact with said contact portion of said at least one gate conductor layer.

156. The '877 Accused Products are manufactured, for example, by TSMC using its 16 Nanometer FinFET manufacturing process. TSMC's 16 Nanometer manufacturing process forms a CMOS device. The manufacturing process comprises forming an isolation region, such as for example, shallow trench isolation (STI), in a semiconductor substrate to provide at least one first active region and at least one second active region. Additionally, the manufacturing process includes forming a gate structure extending across the isolation region and spanning from the first active region to the second active region. The gate structure includes at least one gate dielectric layer, at least one gate conductor layer, and at least one dielectric cap layer.

157. The TSMC 16 Nanometer manufacturing process forms a first source region and a first drain region of a first conductivity type on opposing sides of the gate structure in the first active region. Additionally, the manufacturing process forms a second source region and a second drain region of a second conductivity type on opposing sides of the gate structure in the at least one second active region. An opening is formed, for example, in a portion of the dielectric cap layer to expose a contact portion of the gate conductor layer over the isolation region. Additionally, a remaining portion of the dielectric cap layer is present over at least the first active region or the second active region.

158. TSMC's 16 Nanometer manufacturing process also, for example, forms an interconnect in direct contact with the contact portion of the gate conductor layer.

159. On information and belief, the '877 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

160. On information and belief, TSMC uses, sells, offers for sale, and/or imports TSMC Accused Products in the United States. For example, on information and belief, TSMC: (a) tests,

evaluates, and demonstrates TSMC Accused Products in the United States; and (b) sells, offers for sale, and imports in the United States TSMC Accused Products to one or more other parties, including Defendants NVIDIA and Lenovo.

161. Upon information and belief, TSMC had, and has, knowledge of the '877 Patent. For example, TSMC has knowledge of the '877 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '877 Patent by way of a notice letter dated August 24, 2019.

162. On information and belief, TSMC contributes to and induces direct infringement by others, including TSMC's customers, Defendants NVIDIA, Lenovo, and consumers and users of the TSMC articles and the devices into which they are incorporated. Such directly infringing acts by these others include importation, sales, use, and offer for sale of the foregoing articles that are made by methods covered by the '877 Patent.

163. Upon information and belief, TSMC knowingly induced and induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. Upon information and belief, TSMC made the TSMC Accused Products such as to result in infringement of the '877 Patent if made, used, sold, or offered for sale, or imported into the United States. Upon information and belief, TSMC provided directly or indirectly the TSMC Accused Products to the foregoing other direct infringers knowing and intending that those others would use, sell, offer for sale, and import into the United States those TSMC Accused Products or products incorporating them, thereby directly infringing the '877 Patent. TSMC also contributes to the foregoing infringement by others because the TSMC Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and

claim. Thus, on information and belief, TSMC is contributing to and/or inducing the infringement of the '877 Patent.

164. Other entities directly infringe the '877 Patent by making, using, offering to sell, and selling at least some '877 Accused Products in the United States and by importing '877 Accused Products into the United States. For example, TSMC's customer Defendant NVIDIA has infringed and continues to infringe one or more claims of the '877 Patent, including at least claim 1, literally or under the doctrine of equivalents, at least under 35 U.S.C. § 271(a) by importing into the United States and/or using and/or selling and/or offering for sale in the United States, without authority or license, semiconductor devices, including but not limited to NVIDIA's Volta GV100, fabricated using TSMC's 16 Nanometer process (the "NVIDIA '877 Accused Products"). On information and belief, NVIDIA imports the NVIDIA '877 Accused Products into the United States for sales and distribution to customers located in the United States. On information and belief, NVIDIA sells NVIDIA '877 Accused Products in the United States. For example, NVIDIA hires permanent sales personnel located throughout the United States. In particular, NVIDIA has at least 19 locations throughout the United States. *See* <https://www.nvidia.com/en-us/contact/>. On information and belief, each of these offices engages in sales activities. On information and belief, these sales activities include direct sales by NVIDIA to original equipment manufacturers, including original equipment manufacturers based in the United States. On information and belief, NVIDIA offers the NVIDIA '877 Accused Products for sale in the United States. For example, NVIDIA engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers.

165. On information and belief, Defendant NVIDIA contributes to and induces direct infringement by others, including TSMC. For example, TSMC's directly infringing acts that are

induced and contributed to by NVIDIA includes TSMC's sale and offer to sell in the United States, and importation into the United States, of TSMC Accused Products that are manufactured using processes that infringe the '877 Patent .

166. NVIDIA had, and has, knowledge of the '877 Patent. For example, NVIDIA has knowledge of the '877 Patent as a result of the filing and/or service of this Complaint. Additionally, TSMC had actual knowledge of the '877 Patent by way of a notice letter dated August 24, 2019.

167. NVIDIA knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, NVIDIA induces TSMC's direct infringement by contracting with and encouraging TSMC to offer to sell, sell, and import in the United States TSMC Accused Products that are manufactured using processes that infringe the '877 Patent, including Accused TSMC Products that are incorporated into NVIDIA Accused Products. NVIDIA knows, or should have known, that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint and the August 24, 2019 notice letter. Defendant NVIDIA also contributes to the foregoing infringement by others because the Accused Products have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, NVIDIA is contributing to and/or inducing the infringement of the '877 Patent.

168. NVIDIA's customers, for example, Lenovo have also infringed and continue to infringe claim 1 of the '877 Patent literally or under the doctrine of equivalents at least under 35 U.S.C. § 271(a) by importing into the United States and/or using, selling, and/or offering for sale in the United States, without any authority or license, graphics cards, for example the Lenovo

Thinksystem NVIDIA Quadro GV100 32 GB, that include NVIDIA '877 Accused Products. These products are offered for sale at various retail locations throughout the United States.

169. On information and belief, Lenovo imports at least graphics cards, for example the Lenovo Thinksystem NVIDIA Quadro GV100 32 GB, containing NVIDIA '877 Accused Products into the United States for sales and distribution to customers located in the United States. For example, on information and belief, Lenovo through itself or its affiliates, directly or indirectly, imports such graphics cards to warehouses and distribution centers for sales throughout the United States. On information and belief, Lenovo offers such graphics cards for sale in the United States. For example, Lenovo engages in sales, marketing, and contracting activity in the United States and/or with United States offices of its customers and distributors.

170. On information and belief, Defendant Lenovo is unlawfully importing into the United States, and/or selling within the United States, downstream products that include Accused TSMC Semiconductor Devices and Lenovo Devices ("Accused OEM Downstream Devices"). The Accused OEM Downstream Devices are manufactured using processes that infringe the '877 Patent, directly or indirectly, literally or under the doctrine of equivalents.

171. The methods used to make the Accused OEM Downstream Devices fall within the scope of and include, either literally under the doctrine of equivalents, all of the elements of the asserted claims of the '877 Patent.

172. On information and belief, the Downstream OEM Defendant Lenovo uses, sells, and offers for sale in the United States, and imports into the United States, the Accused OEM Downstream Devices. The Downstream OEM Defendant Lenovo also indirectly infringes the Asserted Patents because it contributes to and induces direct infringement by others, including chip company TSMC.

173. The Downstream OEM Defendant Lenovo had and has knowledge of the '877 Patent. For example, Lenovo has knowledge of '877 Patent as a result of the filing and/or service of this Complaint. Additionally, Lenovo had actual knowledge of the '877 Patent by way of a notice letter dated August 24, 2019.

174. Lenovo knowingly induces the foregoing others' directly infringing acts with specific intent to encourage infringement by those others. For example, Lenovo induces TSMC's direct infringement by contracting with and encouraging TSMC to sell and import in the United States the Accused TSMC Devices, including Accused TSMC Devices that are incorporated into Accused Lenovo Devices. Lenovo knows or should know that these induced acts directly infringe the Asserted Patents because of, for example, the infringement allegations and evidence provided in connection with this Complaint. Also, for example, Lenovo also contributes to the foregoing infringement by others because the Accused TSMC Semiconductor Devices and Accused Lenovo Devices have no substantial-non-infringing uses and are a material part of the invention of each Asserted Patent and claim. Thus, on information and belief, Lenovo is contributing to and/or inducing the infringement of the '877 Patent.

175. Globalfoundries has suffered and continues to suffer damages as a result of Defendants' infringement of the '877 Patent.

176. Defendants' continuing acts of infringement are a basis of consumer demand for the '877 Accused Products. Defendants' continuing acts of infringement are therefore irreparably harming and causing damage to Globalfoundries, for which Globalfoundries has no adequate remedy at law, and will continue to suffer such irreparable injury unless Defendants' continuing acts of infringement are enjoined by the Court. The hardships that an injunction would impose are

less than those faced by Globalfoundries should an injunction not issue. The public interest would be served by issuance of an injunction.

**COUNT VIII**  
**(TSMC Defendants' Willful Infringement of the '877 Patent)**

177. Plaintiff incorporates the allegations of all of the foregoing paragraphs as if fully restated herein.

178. The TSMC Defendants have infringed and/or do willfully infringe the '877 Patent.

179. The TSMC Defendants received actual notice of the '877 Patent at least as early as August 2019 by way a letter to TSMC dated August 24, 2019. After receiving such actual notice of the '877 Patent, the TSMC Defendants proceeded to make, use, test, sell, and/or offer to sell in this District and elsewhere in the United States, and import into this District and elsewhere in the United States, the Accused Products.

180. On information and belief, the TSMC Defendants engaged in such activities despite an objectively high likelihood that its actions constituted infringement of valid patents, including the '877 Patent. The TSMC Defendants knew and should have known that their actions would cause direct and indirect infringement of the '877 Patent.

**PRAYER FOR RELIEF**

WHEREFORE, Plaintiff respectfully requests the following relief:

- a) A judgment that the Asserted Patents are valid and enforceable;
- b) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '178 Patent;
- c) A judgment that the TSMC Defendants' infringement of the '178 Patent was willful, and that the TSMC Defendants' continued infringement of the '178 Patent is willful;



- d) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '643 Patent;
- e) A judgment that the TSMC Defendants' infringement of the '643 Patent was willful, and that the TSMC Defendants' continued infringement of the '643 Patent is willful;
- f) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '357 Patent;
- g) A judgment that the TSMC Defendants' infringement of the '357 Patent was willful, and that the TSMC Defendants' continued infringement of the '357 Patent is willful;
- h) A judgment that Defendants have infringed, directly and indirectly, either literally or under the Doctrine of Equivalents, one or more claims of the '877 Patent;
- i) A judgment that the TSMC Defendants' infringement of the '877 Patent was willful, and that the TSMC Defendants' continued infringement of the '877 Patent is willful;
- j) An injunction against the Defendants, their officers, agents, servants, employees, all parent and subsidiary entities, all assignees and successors in interest, and those persons or entities acting in concert or participation with Defendants, including distributors, enjoining them from further infringement of the Asserted Patents;
- k) A judgment that awards Plaintiff all appropriate damages under 35 U.S.C. § 284 for Defendants' past infringement, and any continuing or future infringement of the Asserted Patents, including pre or post judgment interest, costs, and disbursements

as justified under 35 U.S.C. § 284 and, if necessary to adequately compensate Plaintiff for Defendants' infringement, an accounting:

- i. that Plaintiff be awarded enhanced damages by reason of the TSMC Defendants' willful infringement of the '178 Patent;
  - ii. that Plaintiff be awarded enhanced damages by reason of the TSMC Defendants' willful infringement of the '643 Patent;
  - iii. that Plaintiff be awarded enhanced damages by reason of the TSMC Defendants' willful infringement of the '357 Patent;
  - iv. that Plaintiff be awarded enhanced damages by reason of the TSMC Defendants' willful infringement of the '877 Patent;
  - vi. that this case be declared exceptional within the meaning of 35 U.S.C. § 285 and that Plaintiff be awarded its reasonable attorneys' fees against the TSMC Defendants incurred in prosecuting this action;
  - vii. that Plaintiff be awarded costs and expenses incurred in prosecuting this action; and
- l) A judgment that Plaintiff be awarded such further relief at law or in equity as the Court deems just and proper.

**DEMAND FOR JURY TRIAL**

Pursuant to Under Fed. R. Civ. P. 38, Plaintiff hereby demand trial by jury on all claims and issues so triable.

Dated: August 26, 2019

Respectfully Submitted,

/s/ Michael T. Renaud w/permission T. John Ward, Jr.

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